

IN THE CLAIMS

1. (Withdrawn) A semiconductor device comprising:
a semiconductor substrate;
an insulating layer formed on the semiconductor substrate and having a contact hole therethrough;
a diffusion barrier layer formed on a surface of the insulating layer and on surfaces within the contact hole; and a contact plug which comprises a first sub-plug that fills a lower portion of the contact hole and a second sub-plug that fills an upper portion of the contact hole on the first sub-plug.
2. (Withdrawn) The semiconductor device of claim 1, wherein the first sub-plug is formed of tungsten and the second sub-plug is formed of titanium nitride.
3. (Withdrawn) The semiconductor device of claim 2, wherein the titanium nitride is formed to a thickness of no greater than approximately 1000 Å.
4. (Withdrawn) The semiconductor device of claim 2, wherein the diffusion barrier layer is formed of titanium/titanium nitride.
5. (Currently amended) A method for manufacturing a semiconductor device comprising:
forming an insulating layer having a contact hole therethrough on a semiconductor substrate;
forming a diffusion barrier layer on a surface of the insulating layer and on surfaces within the contact hole;
forming a first metal layer on the insulating layer having the contact hole therethrough, the first metal layer having a void therein below a top surface of the insulating layer;
etching back the first metal layer to the depth of the void to form a first sub-plug without the void in a lower portion of the contact hole;

forming a second metal layer within the contact hole overlying the first sub-plug and on the diffusion barrier layer, the second metal layer being formed thick enough to substantially completely fill the contact hole; and

planarizing the second metal layer until a top surface of the diffusion barrier layer on the insulating layer is exposed, thereby forming a second sub-plug that fills an upper portion of the contact hole on the first sub-plug, the second sub-plug having a substantially flat surface, wherein the width of the first sub-plug is the same as that of the second sub-plug.

6. (Cancelled)

7. (Cancelled)

8. (Cancelled)

9. (Original) The method for manufacturing a semiconductor device of claim 5, wherein the first sub-plug is formed of tungsten.

10. (Original) The method for manufacturing a semiconductor device of claim 5, wherein the second sub-plug is formed of one of tungsten and titanium nitride.

11. (Original) The method for manufacturing a semiconductor device of claim 5, wherein the second sub-plug is formed to a thickness no greater than 1000 Å.

12. (Original) The method for manufacturing a semiconductor device of claim 5, wherein the diffusion barrier layer is formed of titanium/titanium nitride.

13. (Previously presented) The method of claim 5, wherein the plug formed in the contact hole contacts a surface of the semiconductor substrate.

14. (Previously presented) The method of claim 5, wherein the first metal layer is a metal layer capable of generating a void in the contact hole.

15. (Previously presented) The method of claim 5, wherein the second metal layer is formed by atomic layer deposition.